

Worldwide Use of Triclosan: Can Dentistry Do Without this Antimicrobial?

In recent years, as our understanding of germs has grown, we have made great strides in preventing disease. While our immune system is strong enough to defend against most bacteria, the occasional malignant microorganism can pass through those defenses and wreak havoc on our systems. Antibacterial agents, synthetic and natural, aid in killing these microorganisms, but there is cause for concern as some of these agents are harmful to humans, animals, and their surrounding environments.

Triclosan is a synthetic antimicrobial agent.^[1] It is chemically stable and can operate under a wide range of temperatures and pH levels, which makes it both durable and versatile. The chemical is an inhibitor of enoyl-(acyl carrier protein) reductase; this allows it to kill bacteria by inhibiting the fatty acid biosynthetic pathway, which in turn disrupts lipid synthesis and eventually kills the cell. Triclosan was extremely prevalent in hygiene products until recently. It is the active ingredient in many antibacterial hand soaps, skin-purifying wipes, cosmetics, and toys. Triclosan was banned by the USA's Food and Drug Administration (FDA) in September 2016^[2] due, in part, to a lack of evidence supporting the antibacterial claims. In addition, there is evidence suggesting that triclosan significantly reduces testosterone levels,^[3] is associated with increased body mass index,^[4] and is a potent endocrine disruptor. Triclosan accumulates in the body over time and is so ubiquitous that is found in the urine of 75% of the American population.^[5] It appears in breast milk, urine, and plasma, with levels in the blood correlating with consumer use patterns of the antimicrobial. However, the FDA only banned the chemical in consumer products. Triclosan remains a prominent antibacterial agent in hospitals and other medical facilities. This suggests that while it does have some use, the FDA is concerned that prolonged exposure to the chemical can cause health complications. There is also strong evidence that triclosan is toxic to aquatic species such as algae, invertebrates, and certain types of fish and exerts reproductive and developmental effects.^[6] For all these reasons, other countries, including the members of European Union, have banned or restricted use of the chemical.

The scientific community seems to be divided on the topic of the efficacy of triclosan and other antibacterial agents in hand soap. Some are even concerned that the use of triclosan promotes the growth and spread of antibiotic-resistant bacteria. Antimicrobial resistance is a global threat, compromising our ability to treat infectious diseases, and fostering the rise of superbugs, bacteria which have become resistant to all known antibiotic therapies. The World Health Organization has consistently called



attention to the severity of the concerns regarding antibiotic resistance and urged all countries to strengthen their health and surveillance systems and develop new responses to this scourge.^[7]

Opponents of triclosan^[8] suggest that the effectiveness of antibacterial soap is vastly overrated. Others disagree, finding some use in these products. In their study, Gibson *et al.* found that “although there are data gaps in these studies, both have shown that although a reasonable reduction of microorganisms is offered through the use of regular soap formulations, a slightly greater reduction of bacteria and subsequent reduced probability of disease results from using antibacterial formulations.”^[9]

Triclosan is used in dental products including toothpaste and mouth rinses, and its efficacy has been widely tested. The results show the same variance as the results of the use of antibacterial soaps. In their 5-year, longitudinal study utilizing a triclosan-containing dentifrice, Cullinan *et al.* reported that there was no significant effect on *Porphyromonas gingivalis* or *Actinobacillus actinomycetemcomitans*.^[10]

In their 2013 review, Cochrane found, “...moderate-quality evidence showing that toothpaste containing triclosan/copolymer, in addition to fluoride, reduced plaque, gingival inflammation, and gingival bleeding when compared with fluoride toothpaste without triclosan/copolymer.”^[11]

Sifting through all the evidence requires sincere dedication and diligence on the part of all dental practitioners. As in all matters regarding patient care, dentists must utilize their experience and the most current scientific evidence in making their decisions. In recommending triclosan as an oral antimicrobial, practitioners are encouraged to weigh the benefits to each patient after analyzing all the scientific data.

Diana Macri

Assistant Professor,
Department of Allied Health, Dental Hygiene Unit, Hostos Community
College, Bronx, NY, USA
E-mail: dmacri@hostos.cuny.edu

References

- Schweizer HP. Triclosan: A widely used biocide and its link to antibiotics. *FEMS Microbiol Lett* 2001;202:1-7.
- FDA Issues Final Rule on Safety and Effectiveness of Antibacterial Soaps. 02 September, 2016. Available from: <http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm517478.htm>. [Last retrieved on 2016 Dec 21].
- Zorrilla LM, Gibson EK, Jeffay SC, Crofton KM, Setzer WR, Cooper RL, *et al.* The effects of triclosan on puberty and thyroid hormones in male Wistar rats. *Toxicol Sci* 2009;107:56-64.
- Lankester J, Patel C, Cullen MR, Ley C, Parsonnet J. Urinary triclosan is associated with elevated body mass index in NHANES. *PLoS One* 2013;8:e80057.
- Calafat AM, Ye X, Wong LY, Reidy JA, Needham LL. Urinary concentrations of triclosan in the U.S. population: 2003-2004. *Environ Health Perspect* 2008;116:303-7.
- Dann AB, Hontela A. Triclosan: Environmental exposure, toxicity and mechanisms of action. *J Appl Toxicol* 2011;31:285-311.
- World Health Organization. 2015. Global action plan on antimicrobial resistance. World Health Organization; 2015. Available from: http://www.wpro.who.int/entity/drug_resistance/resources/global_action_plan_eng.pdf. [Last accessed on 2017 Mar 08].
- Aiello AE, Larson EL, Levy SB. Consumer antibacterial soaps: Effective or just risky? *Clin Infect Dis* 2007;45 Suppl 2:S137-47.
- Gibson LL, Rose JB, Haas CN, Gerba CP, Rusin PA. Quantitative assessment of risk reduction from hand washing with antibacterial soaps. *J Appl Microbiol* 2002;92 (Suppl 1):136S-43S.
- Cullinan MP, Hamlet SM, Westerman B, Palmer JE, Faddy MJ, Seymour GJ. Acquisition and loss of *Porphyromonas gingivalis*, *Actinobacillus actinomycetemcomitans* and *Prevotella intermedia* over a 5-year period: Effect of a triclosan/copolymer dentifrice. *J Clin Periodontol* 2003;30:532-41.
- Riley P, Lamont T. Triclosan/copolymer containing toothpastes for oral health. *Cochrane Database Syst Rev* 2013;(12):CD010514.

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

Access this article online	
Quick Response Code: 	Website: www.contempclindent.org
	DOI: 10.4103/ccd.ccd_225_17

How to cite this article: Macri D. Worldwide use of triclosan: Can dentistry do without this antimicrobial?. *Contemp Clin Dent* 2017;8:7-8.